



**US Army Corps  
of Engineers**

HUNTSVILLE ENGINEERING  
SUPPORT CENTER

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Defense Environmental Restoration Program  
for  
Formerly Used Defense Sites

Ordnance and Explosives  
Chemical Warfare Materials

**ARCHIVES SEARCH REPORT  
FINDINGS**

**ARMSTRONG COUNTY  
AIR-TO-AIR GUNNERY RANGE**

Dewey and Sully Counties, South Dakota

Project No. B08SD081901

SEPTEMBER 1996

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Prepared by  
US ARMY CORPS OF ENGINEERS  
ST. LOUIS DISTRICT

**ORDNANCE AND EXPLOSIVES  
CHEMICAL WARFARE MATERIALS  
ARCHIVES SEARCH REPORT  
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Armstrong County Air-to-Air Gunnery Range  
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**Project Number B08SD081901**

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## 1.0 Introduction

### 1.1 Authority

In 1986, Congress established the Defense Environmental Restoration Program at 10 U.S.C. 2701 et seq. This program directed the Secretary of Defense to "carry out a program of environmental restoration at facilities under the jurisdiction of the Secretary."

In March, 1990, the EPA issued a revised National Contingency Plan. Under 40 C.F.R. 300.120, EPA designated DOD to be the removal response authority for incidents involving DoD military weapons and munitions under the jurisdiction, custody and control of DoD.

Since the beginning of this program, the U.S. Army Corps of Engineers has been the agency responsible for environmental restoration at Formerly-Used Defense Sites (FUDS). Since 1990, the U.S. Army Engineering and Support Center, Huntsville, has been the Mandatory Center of Expertise and Design Center for Ordnance and Explosives.

### 1.2 Subject

The former Armstrong County Air-to-Air Gunnery Range consisted of approximately 404,439 acres and was used for training exercises by pilots stationed at various airfields during World War II. The site is located approximately six miles east of Eagle Butte in Dewey and Sully Counties, South Dakota.

### 1.3 Purpose

This Archives Search Report (ASR) compiles information obtained through historical research at various archives and records holding facilities, interviews with persons associated with the site or its operations, and personal visits to the site. All efforts were directed towards determining possible use or disposal of ordnance and/or CWM on the site. Particular emphasis was placed on establishing the type of munitions, quantities and area of disposal. Information obtained during this process was used in developing recommendations for further actions at the site.

### 1.4 Scope

The entire site of the former precision bombing range, consisting of 404,439.41 acres, was evaluated in assessing the potential for OE contamination. It is designated as DERP-FUDS Site No. B08SD081901.

This report presents the history of the site, description and characterization of the immediate surrounding area, real estate ownership information, findings of a visual field survey, and OE site analysis, including an evaluation of potential ordnance contamination. A separate **Executive Summary** supplements these ASR FINDINGS and furnishes the CONCLUSIONS and RECOMMENDATIONS.

## 2.0 Previous Investigations

### 2.1 Corps of Engineers Documents

Under the Defense Environmental Restoration Program, the Omaha District prepared a Project Inventory Report (INPR) which contained a Findings and Determination of Eligibility (FDE), for the subject Armstrong County Air-to-Air Gunnery Range. The FDE states that the site, acquired in 1943, was used in support of Pierre Army Air Field, Fairmont Army Air Field, Harvard Army Air Field, and Bruning Army Air Field. The site was determined to be eligible for the Defense Environmental Restoration Program for Formerly Used Defense Sites as established under 10 USC 2701 et seq. A RAC score of 3 was assigned. A copy of the INPR is included at Appendix D.

A February 1993 site inspection by the Omaha District did not find evidence of ordnance except for some .50 caliber points and casings displayed by one of the landowners.

The INPR stated that a Certificate of Clearance (COC) had not been located for the subject site.

### 2.2 Other Reports

No other site investigation reports were obtained during the archive search.

### 3.0 Site Description

#### 3.1 Land Usage

##### 3.1.1 Location

The former Armstrong County Air-to-Air Gunnery Range, consisting of 404,439.41 acres, is located approximately six miles east of Eagle Butte, South Dakota. The majority of the site is within the boundaries of Dewey County with a portion in Sully County.

##### 3.1.2 Past Use

Prior to DoD acquiring usage of the land, it was used for grazing and agriculture.

##### 3.1.3 Current Uses

The majority of the land is used for grazing with some small farming operations.

#### 3.2 Climatic Data

The site is located in a continental climate, with frequent daily temperature fluctuations and distinct seasons. Winters generally is cold and dry with storms of short duration. Normal temperatures for the season are in the middle teens and precipitation is mainly in the form of snow. Seasonal snowfall has varied from under 9 inches to over 75 inches. Blizzard type storms occur on occasion but are infrequent. Average yearly snowfall is a little under 33 inches.

Spring is characterized by marked increases in both temperature and precipitation. Nearly one-third of the annual rainfall occurs during the spring months

Summers are hot but not extreme. Temperatures of 100 degrees or over usually occur three or four times a year, but nights are normally cool and comfortable. Summertime precipitation is mainly in the form of showers and thunderstorms. Hail occurs about 2 times a year on the average with the thunderstorms.

Autumn is a very pleasant season with mild warm days, cool nights, and plentiful sunshine.

The prevailing winds are south southeasterly every month of the year except February which is northwesterly. The winds are persistently strong most of the year, but highest in March, April and May and lowest in July and August.

At noon, the mean relative humidity is 67 percent in January, 54 percent in April, 53 percent in July, and 53 percent in October.

In Huron, the sun shines for about 55 percent of the daylight hours in winter, and for more than 75 percent in summer. Skies are clear about 29 percent of the time, partly cloudy about 29 percent and cloudy about 42 percent.

Climatological data for the area are summarized in TABLE 3-1. Data were collected at the National Weather Service meteorological station at the Huron Regional Airport. The site is located approximately 80 miles northwest of the Regional Airport.

**CLIMATOLOGICAL DATA FOR  
HURON, SOUTH DAKOTA  
TABLE 3-1**

Month	Temperature		Precipitation	Wind	
	Average Minimum ('F)	Average Maximum ('F)		Average Speed Miles/Hour	Average Direction
January	2.3	24.1	0.41	11.4	SSE
February	9.1	29.7	0.68	11.3	NW
March	21.7	42.1	1.66	12.4	SSE
April	34.0	58.6	2.09	13.4	SSE
May	44.8	70.4	2.87	12.3	SSE
June	55.5	80.3	3.35	11.2	SSE
July	61.7	87.1	2.67	10.3	SSE
August	58.8	84.8	1.97	10.5	SSE
September	47.3	74.2	1.72	11.2	SSE
October	35.4	61.5	1.47	11.2	SSE
November	21.8	43.0	0.72	11.6	SSE
December	7.8	28.3	0.47	11.1	SSE
Average	33.4	57.0	20.08	11.5	SSE

### 3.3 Geology and Soils

#### 3.3.1 Geology

The site is located in the southern Missouri Plateau - Unglaciaded Section of the Great Plains Province. The Missouri Plateau is generally comprised of old plateaus, terrace lands, local badlands, and isolated mountains. The Armstrong Gun Range lies just north of the White River Badlands or "Big Badlands" which has characteristics of steep slopes along with numerous and closely spaced drainage lines. North of the badlands is a single widespread rolling upland which seems to represent a once continuous surface from which the newer and sharper relief has been carved. At the site, this general level is cut on shale (Pierre formation) which contains almost no sandstone beds (Fenneman 1931).

The Pierre formation has a total thickness of about 1400 feet; however, a maximum of only 200 feet is exposed in the area. Of this exposure the upper 30 to 40 feet are the most significant for structural mapping. The Pierre is called shale, and in general, the exposures of massive appearing soft rock do have the appearance of a typical uniform shale. The color is usually medium to dark gray when dry and black when wet, but may be buff, brown or mottled gray and brown near the top of the formation. Close inspection reveals that the upper Pierre contains considerable silt and becomes more silty towards its top. At some exposures the rock consists largely of very thin streaks of clay shale intercalated with very thin streaks of silt (Morgan and Petsch 1945).

### 3.3.2 Soils

The site soils are composed of several different soil profiles. The area is large and the terrain differs drastically from location to location. The majority of the soils fall into three soil profiles. These profiles are intermingled with each other throughout the site. The first profile consists of shallow, well drained, sloping to very steep, calcareous clayey soils on the higher parts of the landscape. The surface layer was formed in material from the underlying shale. This soil is a light brownish-gray, highly plastic clay found to a depth of 10 inches. It is hard when dry and friable when wet. The subsoil is shale found to a depth of 60 inches. The soil properties of the first profile are shown below.

Soil Profile						
DEPTH (in)	SOIL DESCRIPTION	PERCENTAGE PASSING SIEVE NUMBER			LIQUID LIMIT	PLAS- TICITY INDEX
		#4	#40	#200		
0-10	highly plastic clay	100	95-100	85-100	60-90	28-55
10-60	shale	100	95-100	85-100	60-120	31-85
Table taken from Soil Survey of Dewey County, SD						

The second soil profile that is commonly encountered within the site area is similar to the above profile, but is found on the lower parts of the landscape and the depth of clay is deeper. The surface layer is a grayish-brown, highly plastic clay to a depth of 33 inches. It is extremely hard when dry, extremely firm when moist, and very sticky and plastic when wet. The subsoil is a very dark gray shale to a depth of 60 inches. A typical profile is shown in the following table.

Soil Profile						
DEPTH (in)	SOIL DESCRIPTION	PERCENTAGE PASSING SIEVE NUMBER			LIQUID LIMIT	PLAS- TICITY INDEX
		#4	#40	#200		
0-33	highly plastic clay	100	90-100	85-100	50-85	22-50
33-60	shale	100	95-100	90-100	60	25-60
Table taken from Soil Survey of Dewey County, SD						

The third soil profile is similar to the second, but the depth of clay is shallower then the above profile. Again, the surface layer is a grayish-brown, highly plastic clay to a depth of 16 inches. The subsoil layer is multicolored platy shale to a depth of 60 inches. A typical profile is shown below.

Soil Profile						
DEPTH (in)	SOIL DESCRIPTION	PERCENTAGE PASSING SIEVE NUMBER			LIQUID LIMIT	PLAS- TICITY INDEX
		#4	#40	#200		
0-16	highly plastic clay	100	90-100	85-100	60-90	28-63
16-60	shale	100	95-100	90-100	75-115	50-80
Table taken from Soil Survey of Dewey County, SD						

The potential for frost development in the Armstrong Air-to-Air Gunnery Range site extends to a depth of 5 1/2 to 6 feet.

### 3.4 Hydrology

#### 3.4.1 Ground Water

Ground water is one of South Dakota's most important natural resources. Ground-water reservoirs constitute a large and reliable source of water for domestic, industrial, stock, and

municipal use; although it's resources are utilized more in the east then the west. Shallow aquifers are absent or scarce in much of the State, but those that do exist are recharged by infiltration of precipitation that falls on the immediate area.

In Dewey County, artesian water from wells can be obtained over practically all of the county without undue cost due to the numerous deep aquifers. Only the major formations are discussed below. The Deadwood Formation consists of quartz sandstone interbedded with clay. It is approximately 450 feet thick and yields small to moderate amounts of water for stock and domestic supplies. The Winnipeg Formation, which overlies the Deadwood Formation, is about 180 feet thick. It is a sandstone unit which yields saline water under pressure. The water in this formation has not been used but reports estimate the yield to be about average. The Whitewood Dolomite and Red River Formation consists of massive, buff limestone and dolomite with a maximum thickness of about 550 feet. It contains an enormous volume of saline water under high artesian pressure at temperatures as high as 185°. These aquifers are not used as a source of water in South Dakota. The Madison Group ranges in thickness from 250 to 600 feet and is fine-grained limestone and dolomite containing numerous caverns, some which are lined with calcite crystals. It yields large quantities of good to saline water that is under high artesian pressure. The Inyan Kara Group is a conglomerate sandstone which has a maximum thickness of about 485 feet. It is a permeable and productive aquifer but it yields saline water that usually is under enough pressure to flow from wells. The supply is developed moderately and could support a larger withdrawal (US Geological Survey 1964).

In the area of the Armstrong Gun Range, there are bodies of shallow ground water. Domestic consumption is usually from these bodies, wherever the quality is good, and from reservoirs when acceptable (Rothrock and Robinson 1938).

### 3.4.2 Surface Water

The site is drained by many small creeks which generally flow to the south and east and discharge into either the Cheyenne River or the Missouri River which are part of the Lake Oahe Main Stem Reservoir project. No stream gages are located on any of the small creeks near the site. A US Geological stream gage on the Cheyenne River at the western boundary of the site has stage and flow records from 1920 through 1967. A new gage was established upstream on the Cheyenne River at Cherry Creek with records from 1961 to the present.

### 3.5 Ecology

The information on the endangered and threatened species for this site has been provided by the U.S. Fish and Wildlife Service (USFWS) and the South Dakota Department of Game, Fish and Parks (DGFP).

The USFWS provided the following list of Federally-listed species that includes candidate, threatened and endangered species for Dewey, Haakon, Stanley, Sully, and Potter counties, South Dakota: American burying beetle (Nicrophorus americanus), endangered; sturgeon

chub (Hybopsis gelida), candidate; sicklefin chub (Hybopsis meeki), candidate; pallid sturgeon (Scaphirhynchus albus), endangered; black-footed ferret (Mustela nigripes), endangered; Swift fox (Vulpes velox), candidate; piping plover (Charadrius melodus), threatened; peregrine falcon (Falco peregrinus), endangered; whooping crane (Grus americana), endangered; bald eagle (Haliaeetus leucocephalus), endangered; and interior least tern (Sterna antillarum athalassos), endangered.

Literature provided by the DGFP listed the following state threatened and endangered species for Dewey, Haakon, Potter, Stanley and Sully counties, South Dakota: pallid sturgeon, endangered; northern river otter (Lutra canadensis), threatened; black-footed ferret, endangered; Swift fox, threatened; whooping crane, endangered; bald eagle, endangered; interior least tern, endangered; and piping plover, threatened. Lake Oahe, located on the Missouri River, is an important area that is used heavily by nesting interior least tern and piping plover.

No additional information on the occurrence of rare or endangered species or natural communities is known at this time. This does not mean that other state or federally-listed species may not be present within the areas of interest. An on site inspection by appropriate state and federal personnel may be necessary to verify the presence, absence, or location of listed species, or natural communities if remedial action is recommended as part of the final ASR.

### 3.6 Demographics

#### 3.6.1 Center of Activity

The Armstrong County Air-to-Air Gunnery Range site is located near the City of Eagle Butte, Dewey County, South Dakota. A portion of the site is also located in Sully County, South Dakota.

#### 3.6.2 Population Density

CITY/COUNTY	CITY: Eagle Butte	COUNTY: Dewey
AREA (sq. mi.)	1.8	2,303
POPULATION	489	5,563
POP DENSITY	271.7persons/sq.mi	2.42 persons/sq.mi.

CITY/COUNTY	COUNTY: Sully
AREA (sq. mi.)	1,007
POPULATION	1,552
POP DENSITY	1.54 persons/sq.mi.

### 3.6.3 Types of Businesses and Industry

The number of business establishments in the Eagle Butte area can be broken down by type as follows: manufacturing 4.4%; agriculture 1.1%; trade 42.2%; services and financial 27.8%; and other 24.4%. Of the people in the area employed by businesses, approximately 1.68% are unclassified. Prominent employers in the area are trade and financial businesses at about 61.0%, services at 23.2%, manufacturing at 3.36%, and 1.68% unclassified. Foregoing percentages are at mid-March 1992.

### 3.6.4 Types of Housing

Housing in Eagle Butte is composed of both single family and multi-family dwellings. The median value of 171 specified owner-occupied housing units in Eagle Butte is \$23,200.

### 3.6.5 New Development in the Area:

In recent years Eagle Butte has aquired approximately 10 new businesses, lodging facilities, and a new law enforcement complex.

### 3.6.6 Typical Cross Sections of the Population:

Approximately 30.1% of the population of Eagle Butte City is White; 0% Black; 68.7% American Indian, Eskimo or Aleut; 1.0% Asian or Pacific Islander; and 0.2% other races. The percent of the total population (of any race) that is of Hispanic origin is 2.86%. The part of the population under the age of 18 is 27.9%, and the part over the age of 65 is 8.3%.

## 4.0 Historical Ordnance Usage

### 4.1 Historical Site Summary

In 1943, the War Department acquired from the Department of Agriculture, Department of Interior, and private individuals in the Counties of Armstrong and Sully, South Dakota, a total of 404,439.41 acres for use as the Armstrong Air to Air Gunnery Range. The Army Air Corps used Armstrong Air to Air Gunnery Range for aerial target practice. The Army Air Corps trained personnel in fighter planes from Pierre Army Airfield, Pierre, South Dakota; Fairmont Army Airfield, Fairmont, Nebraska; Harvard Army Airfield, Harvard, Nebraska; and Bruning Army Airfield, Bruning Nebraska. Due to its primary use by Pierre Army Airfield, the Army Air Corps also called the Site Pierre Air to Air Gunnery Range (Army Service Forces 1948).

The U.S. Army Corps of Engineers constructed 3 flight markers on the Range to guide aircraft to the target practice area. The U.S. Army Corps of Engineers made no other improvements to the Range. The Army Air Corps reported the use of only .50 calibre ammunition at the Range (Army Air Corps 1946a); (Army Air Corps 1946b). Lead planes used connecting cables to tow targets made of wire mesh. In 1947, the War Department declared Armstrong Air to Air Gunnery Range surplus to the needs of the military (Corps of Engineers 1949).

A bomb & shell disposal team from the U.S. Army Corps of Engineers issued two separate certificates of decontamination for the Armstrong Air to Air Gunnery Range, both dated 5 September 1947. One certificate pertaining to the portion of the site known as the Little Bend Area in Sully County states "a careful visual inspection" found the area "to be clear of all dangerous and/or explosive materials reasonably possible to detect. All the scrap metal on the bombing range has been disposed of..." (Corps of Engineers 1947a) The bomb & disposal team conducted the clearance operation on foot (Corps of Engineers 1947b). The War Department returned this portion of the Site, also known as the Little Bend Range and the Western Sully County Bombing Range, back to the Department of Agriculture (80 acres) and the Department of Interior (7,992.98 acres). The U.S. Army Corps of Engineers now owns this portion of the Site and uses the land as part of the Lake Oahe Main Stem Reservoir project.

Regarding the remaining portion of the Site, the other certificate of decontamination also states "a careful visual inspection" found the area "to be clear of all dangerous and/or explosive materials reasonably possible to detect. All the scrap metal on the bombing range has been disposed of..." (Corps of Engineers 1947c) Due the vast extent of this area, the bomb & disposal team conducted the inspection by vehicular patrol. Today, the Department of Interior, Bureau of Indian Affairs and the Cheyenne River Sioux Tribe, with a few individuals own the majority of the 396.366.43 acres. The owners use the land for grazing purposes and small farming operations.

## 4.2 Review of Historical Records

**National Archives  
8th & Pennsylvania  
Washington, D.C. 20408  
(202) 501-5671**

The research team did not find any pertinent information.

**National Archives at College Park  
8601 Adelphi Road  
College Park, MD 20740  
(301) 713-6800**

Record Group 341 - Records of Headquarters U.S. Air Force  
Entry: 494

Box 22; Subject: Correspondence, Oregon thru Texas (disposal information on Pierre Air to Air Gunnery Range, SD; general installation information on Pierre AAF).

**National Archives  
Suitland Reference Branch  
4205 Suitland Road  
Suitland, MD 20409  
(301) 457-7182**

The National Archives and Records Administration transferred all pertinent record groups to the National Archives in Washington, D.C. or the National Archives at College Park, MD..

**Washington National Records Center  
4205 Suitland Road  
Suitland, MD 20409  
(301) 457-7010**

The research team reviewed accession listings for RG 341 and RG 342 and did not find any pertinent information. Office box files were also checked for information.

**National Personnel Records Center  
Military Personnel Records  
9700 Page Avenue  
St. Louis, MO 63132-5100  
(314) 538-4085**

Record Group 342 - Records of U.S. Air Force Commands, Activities, and Organizations  
Accession: 44-A-6003

Box 25 of 53; Subject: Awards & Decorations, 2d AF Bombing & Gunnery Ranges, Completions Reports (information on Pierre AAF and status of all ranges under the Second Air Force, 1943).

Box 30 of 53; Subject: Acquisition of land and amendments for Armstrong AA Gunnery Range; information on activities at the Armstrong County Aerial Gunnery Range).

Box 39 of 53; Subject: Designations and Activities for all sites (information on Armstrong County Air-to-Air Range; information on the use of Pierre Air-to-Air Range).

Box 40 of 53; Subject: Correspondence in establishment of Sioux City and Rapid City sites (status of Pierre ranges, 1943).

Box 41 of 53; Subject: Correspondence on usage of sites (descriptive information on the Pierre Air-to-Air Range; information on renewal of lease and change in jurisdiction over the Armstrong County Air-to-Air Gunnery Range; information on the renewal of leases for Rapid City Bombing and Gunnery Ranges; information on Second Air Force bases and ranges, 1943, includes Pierre AAF; status and projections for Second Air Force bombing and gunnery ranges, including the Armstrong County Range).

Box 47 of 53. Subject: Watertown Ranges, Pierre AFB (information in reference to the Pierre Bombing and Gunnery Ranges; information on incident at the Armstrong County Gunnery Range; references to other bombing and gunnery ranges under the Second Air Force and joint use; surplus information on Pierre Air to Air Gunnery Range).

Box 51 of 53; Subject: Sioux City, Harvard, Rapid City, Watertown, Armstrong

**U.S. Air Force Historical Research Agency  
600 Chennault Circle  
Maxwell AFB, AL 36112-6424  
(334) 953-2447**

**Record Group - Corps of Engineers, Base Units Material**

Entry: IRIS 02045218 thru 02045244

Box: Sioux City; Sioux City Folders: 02045218-02045244 (information on the designation of the Armstrong County Air to Air Gunnery Range).

**Record Group - Air Force Unit Histories**

Entry: Decimal 287.50-34 (June 1946) thru 287.56-12 (May 1945)

Folders: 00176560 thru 00176575 (history of Pierre Army Air Field, September 1944; history of units at Pierre Army Air Field, April - June 1944; history of Pierre Army Air Field, February 1944).

**U.S. Army Center of Military History  
1099 14th Street, N.W.  
Washington, D.C. 20005-3402  
(202) 761-5416**

The research team reviewed vertical and card files and did not find additional pertinent information.

**Historical Office  
U.S. Army Chemical-Biological Defense Command  
Building E5183  
Aberdeen Proving Ground, MD 21010-5423  
(410) 671-4430**

The research team reviewed the historical office files and did not find any additional pertinent information. Previously, the research team copied from the office files a CWM Report of Controlled and Other Critical Items of Equipment, dated 28 February 1945, pertaining to the 224th Base Unit at Sioux City Army Base. CWM items in the report include two HS Vapor Detector Kits, M4; aircraft smoke tanks; and decontaminating apparatus. Also, the research team copied from the office files a CWM Report of Controlled and Other Critical Items of Equipment, dated 28 February 1945, pertaining to the 46th Bomber Operations Training Wing at Rapid City Army Air Base. CWM items in the report include two HS Vapor Detector Kits, M4; aircraft smoke tanksp; decontaminating apparatus; and four Set, gas, identification, detonating, M1.

**National Archives-Rocky Mountain Region  
Building 48, Denver Federal Center  
Denver, CO 80225  
(303) 236-0817**

Record Group 121 - Records of the Public Buildings Service  
Entry: Construction Management Division, Denver,  
Box 34; Subject: Progress Photos and Final Photos, 1915-70, Pierre, SD thru Logan,  
UT (Folders on Pierre AAF)

**Federal Records Center - Denver  
Building 48, Denver Federal Center  
P.O. Box 25307  
Denver, CO 80225  
(303) 236-0804**

The research team did not find any pertinent information.

**National Archives-Central Plains Region  
2312 East Bannister Road  
Kansas City, MO 64131  
(816) 926-6272**

The research team did not find any pertinent information.

**Federal Records Center-Kansas City  
2312 East Bannister Road  
Kansas City, MO 64131  
(816) 926-7271**

The research team reviewed available accessions at this repository and did not find any pertinent information.

**Cultural Heritage Center  
South Dakota State Historical Society  
900 Governors Drive  
Pierre, SD 57501-2217  
(605) 57501-2217**

The research team did not find any pertinent information.

**South Dakota State Library  
800 Governors Drive  
Pierre, SD 57501  
(605) 773-3131**

The research team conducted an extensive review of card catalog files, vertical files, aerial and ground photograph collections, map collection, and secondary resources and did not find any additional pertinent information.

**State Historic Preservation Office (SHPO)  
900 Governors Drive  
Pierre, SD 57501-2217  
(605) 773-3458**

The research team conducted a review of files and did not find any additional pertinent information. However, the SHPO did refer the research team to a number of other state organizations for research.

**I.D. Weeks Library  
University of South Dakota  
414 East Clark Street  
Vermillion, SD 57069-2390  
(605) 677-6088**

The research team did not find any pertinent information.

**Center for Western Studies  
Augustana College  
P.O. Box 727  
Sioux Falls, SD 57197  
(605) 336-4007**

After coordination with the archivist at the Center for Western Studies, the Lead Historian sent by fax a letter with an enclosure describing all the team's sites. The research team did not find any pertinent information.

**Watertown Regional Library  
611 B Avenue, N.E.  
Watertown, SD 57201-0250  
(605) 882-6226**

The research team consulted with the Chief Librarian and conducted a research of their special collections on the military in South Dakota. The research team did not find any pertinent information.

**Timber Lake and Area Historical Society  
P.O. Box 181  
Timber Lake, SD 57656-0181  
(605) 865-3787**

The research team received information on the annexation of Armstrong County by Dewey County, SD. Members of the Timber Lake and Area Historical Society, also provided referrals for interviews.

**Timber Lake Topic (Newspaper)  
P.O. Box 10  
Timber Lake, SD 57656-0010  
(605) 865-3546**

The research team inquired as to historical information available. The research team did not receive any pertinent information. However, the Editor of the Timber Lake Topic provided us referrals for interviews.

**Dewey County Library  
P.O. 68  
Timber Lake, SD 57656  
(605) 865-3541**

The research team did not find any additional pertinent information.

**Environmental Protection Department  
Cheyenne River Sioux Tribe  
P.O. Box 590  
Eagle Butte, SD 57625  
(605) 964-6559**

The research team received copies of historical documents pertaining to the acquisition, Army Air Corps training, disposal and decontamination of the Armstrong Air-to-Air Gunnery Range. The Environmental Protection Department, Cheyenne River Sioux Tribe, previously retrieved their historical documentation from the National Archives and Records Administration.

#### 4.3 Summary of Interviews

Interviews were conducted by telephone and in person, both prior to and during the site inspection. The primary purpose of these interviews was to make initial contact with individuals knowledgeable of the site and to coordinate follow-up visits during the site inspection phase of this ASR's preparation. A list of persons interviewed is included at Appendix H. Any pertinent information derived from these discussions is covered within the context of this report.

##### 4.3.1 Interview with Environmental Director

David Nelson is the Environmental Director for the Environmental Protection Department, Cheyenne River Sioux Tribe. The St. Louis team questioned him about the origins of the 20mm practice projectile which is displayed in the Eagle Butte Environmental Office. Mr. Nelson said that a man brought the 20mm to the office in 1993 or 1994. The man said his nephew had found it when he was riding one day. Mr. Nelson said the man left before he was able to get his name and no one in the office recognized him. Mr. Nelson has been unable to locate him since then. The only thing he is sure of is that the 20mm was found on tribal land, and it is the only one his office is aware of.

#### 4.4 Air Photo Interpretation and Map Analysis

##### 4.4.1 Interpretation of Aerial Photography

Photoanalysis and land use interpretation were done using the following listed photography:

<u>Photography Date</u>	<u>Scale</u>	<u>Source</u>	<u>Identifier(s) Frame(s)</u>
24 Oct 1950	1"=5280'	ASCS	BNT 1G 17 thru 52; 100 thru 117; 129 thru 181; 2G 28 thru 157

The maps cited at paragraph 4.4.2 (below) were used as references for the photography.

Photography listed above covering the Armstrong County Air-to-Air Gunnery Range was examined. A lack of features pertaining to military use is attributed to the fact that this was an air-to-air range. No targets or boundary markers were observed. Disturbances of the soil due to military activities were not visible.

Terrain at the site is hilly, with relief varying up to 200' locally. The Missouri River is the major drainage feature in the area. Small rivers, streams and creeks drain dendritically into the Missouri. Lake Ohae, forming part of the southern boundary of the study area, was formed by damming the Missouri River. Land use in the study area is mostly agriculture -- specifically grazing. Primary hard-surface roads form the backbone of an infrastructure which is comprised mainly of secondary hard-surface and unpaved roads. A rail line cuts through the northern end of the study area. The area is largely unpopulated; the territory belongs to the Cheyenne River Indian Reservation.

#### 4.4.2 Map Analysis

The site was analyzed using the following maps:

- (1) USGS 1:250,000 quadrangle maps:  
    McINTOSH, S. Dakota (1953), revised 1976  
    PIERRE, S. Dakota (1954), revised 1976
- (2) War Dept. Real Estate Map:  
    Armstrong County Air to Air Gunnery Range (Feb, 1948)

Review of the above-cited map sheets confirms general descriptions found in paragraph 4.4.1 above. The maps were also useful in locating boundaries and identifying features on the photography.

## 5.0 Real Estate

### 5.1 Confirmed DoD Ownership

The War Department acquired the site, consisting of 404,439.41 acres, by use permit from the Department of Agriculture (7,992.98 acres), through Public Land Order No. 147 from the Department of Interior (80 acres), and by leases (396,366.43 acres) in 1943. The site was declared surplus in 1947 and returned to original owners.

### 5.2 Potential DoD Ownership

No information indicating DoD ownership of any related lands other than those mentioned above was uncovered during the archive search.

### 5.3 Significant Past Ownership

There was no significant past ownership, other than DoD, that would have contributed to OE contamination.

### 5.4 Present Ownership

The majority of the site is owned by the Department of Interior, Bureau of Indian Affairs and the Cheyenne River Sioux Tribe, with a few private individuals owning deeded properties. Most of this land is used for grazing with some farming operations. The southeastern portion of the site, known as the Little Bend Area in Sully County, is owned by the Corps of Engineers.

## **6.0 Site Inspection**

The site inspection was conducted on 6 August 1996, by the following personnel of the St. Louis District:

Dennis W. Gilmore	Project Manager
Gregg Kocher	Safety Specialist
M. Kevin McCaffrey	QASAS

The site survey confirmed the presence of OE debris within the FUDS.

This former World War II air-to-air gunnery range covers all of southern Dewey County south of State Highway 212. The 404,439.41 acre site formerly encompassed all of the now defunct Armstrong County and is within the Cheyenne River Indian Reservation. The terrain is varied with vegetation consisting primarily of grasses.

The southern portion of the site has been inundated, to an elevation of 1630 feet, by the development of Lake Oahe. This includes a portion of the former range commonly known as Little Sully Point which records indicate may have been used as an air-to-ground range, possibly complete with on-ground targets. Based on real estate information, this was part of the Armstrong acquisition.

Due to the vastness of the site and lack of historical information identifying areas of potential contamination, the site inspection focused on areas identified by Mr. Dugan Smith, Program Manager of the Tribe's Environmental Protection Department.

The team met with Dugan Smith at the reservation's environmental office. The Tribe has commissioned an environmental study which includes an assessment of OE contamination. Their efforts have resulted in several items of OE being recovered. The majority of these items are expended .50 caliber casings and points. Other items include at least one 20mm round, musket balls, and a .45-70 bullet. Specific locations where these items were recovered is not known. A large portion of the recovered items are turned in to the environmental office by individuals who happen across them.

No concentration of OE was found as would be expected based on the utilization of the range. Expended .50 caliber rounds can be, and have been, recovered throughout the site and beyond. Most of the recently recovered items have been located inches below the ground surface.

Photographs of the site are located in Appendix I.

## **7.0 Evaluation of Ordnance Presence**

Based on the extensive archive searches performed, the interviews with the owners and/or managers of this DERP-FUDS site, and observations made during the conduct of the site inspection, this site is known to contain OE, mainly small arms.

As stated in Section 6.0 - Site Inspection, various items of OE, reportedly recovered on the site, were observed. The small arms were generally covered by several inches of soil. Most of the recent finds have occurred after heavy rains. None of the observed items presented an explosive hazard.

The origin of the single 20mm round previously recovered remains unknown. According to Mr. Dave Nelson, of the Tribe's environmental office, the 20mm round was left on his desk, in 1993, by a man who said that his nephew had found it while out riding. He believes it was recovered on tribal lands, but cannot confirm the location, as he has been unsuccessful in locating the individual who left the item on his desk. No other 20mm rounds have been found.

There is some question as to the .45-70 origins based on its condition and appearance which show no signs of deterioration. Had it been exposed to the ground and/or elements for a hundred years, some deterioration should be noted. Circumstances surrounding this recovery, as well as that of the musket balls, are also unknown. In any event, they would not pose any additional OE related risks.

## **8.0 Technical Data of Ordnance and Explosives**

The ordnance used on the air-to-air gunnery range during World War II was apparently limited to .50 caliber machine gun ammunition. However, one 20mm expended round was reportedly recovered on the site, therefore a data sheet is included for informational purposes. A .47-70 cartridge was also discovered on the site. The cartridge was used by the U.S. active military from 1873 to 1892 in the Springfield rifle. Various state National Guard units, as well as civilian hunters, continued to use the cartridge well after 1892. A data sheet has been included for the .45-70 cartridge. Data sheets for the listed ordnance are located in Appendix C.

Cartridge, Armor Piercing, Caliber .50 Caliber, M2

Cartridge, 20 MM, H.E.-I, MK. I

Cartridge, Caliber .45-70

## **9.0 Evaluation of Other Site Information**

No other environmental concerns relevant to DoD were discovered during the research or site visit.